

IN THE CLAIMS:

Please amend the claims as follows:

1-36 (cancelled).

37. (Currently Amended) A method of chemical mechanical planarization of a substrate comprising a copper-containing structure, a dielectric, and a barrier layer disposed between the copper-containing structure and the dielectric, the barrier layer comprising tantalum, tantalum nitride, or both, comprising the steps of:

a) providing a substrate comprising a copper-containing structure, a dielectric, and a barrier layer disposed between the copper-containing structure and the dielectric, the barrier layer comprising tantalum, tantalum nitride, or both, wherein the substrate has been chemically mechanically polished with a phase one slurry to planarize the copper ~~to about the level of the barrier/adhesion layer of Ta/TaN overlying a dielectric layer;~~

b) providing a chemical mechanical planarization composition between the substrate and a polishing pad, the composition comprising in aqueous solution, hydroxylamine nitrate, at least one nitrate which is not hydroxylamine nitrate, and at least one abrasive, wherein the chemical mechanical planarization composition is acidic ~~said composition provided;~~ and

c) planarizing said ~~barrier/adhesion~~ barrier layer by moving the polishing pad relative to said ~~barrier/adhesion~~ barrier layer while having said chemical mechanical planarization composition therebetween, ~~said wherein the planarizing selectively planarizing step results in selective planarization of the barrier layer.~~

38-41. (Cancelled)

42. (Previously Presented) The method of claim 37 wherein the at least one nitrate which is not hydroxylamine nitrate is ammonium nitrate.

43. (Previously Presented) The method of claim 37 wherein the at least one nitrate which is not hydroxylamine nitrate is aluminum nitrate.

44. (Previously Presented) The method of claim 37 wherein the at least one nitrate which is not hydroxylamine nitrate is nitric acid.

45. (Previously Presented) The method of claim 44 wherein the chemical mechanical planarization composition further comprises benzotriazole.

46. (Previously Presented) The method of claim 37 wherein the chemical mechanical planarization composition further comprises benzotriazole.

47. (Currently Amended) The method of claim 37 wherein the hydroxylamine nitrate and the at least one other nitrate in aqueous solution comprise an oxidizing solution, which is part of the chemical mechanical planarization composition, and wherein the oxidizing solution has a pH between about 2.1 and about 3.2.

48. (Previously Presented) The method of claim 37 wherein the abrasive comprises colloidal silica.

49. (Previously Presented) The method of claim 48 wherein the colloidal silica has a particle size range of between 20 and 150 nanometers.

50. (Currently Amended) A method of chemical mechanical planarization of a substrate comprising a copper-containing structure, a dielectric, and a barrier layer disposed between the copper-containing structure and the dielectric, the barrier layer comprising tantalum, tantalum nitride, or both, comprising the steps of:

a) providing a substrate comprising a copper-containing structure, a dielectric, and a barrier layer disposed between the copper-containing structure and the dielectric, the barrier layer comprising tantalum, tantalum nitride, or both, wherein the substrate has been chemically mechanically polished with a phase one slurry to planarize the copper;

b) providing a chemical mechanical planarization composition between the substrate and a polishing pad, the composition comprising in aqueous solution, hydrazine, at least one nitrate, and at least one abrasive; and,

c) planarizing said ~~barrier/adhesion~~ barrier layer by moving the polishing pad relative to said ~~barrier/adhesion~~ barrier layer while having said chemical mechanical planarization composition therebetween, said wherein the planarizing selectively planarizing step results in selective planarization of the barrier layer.

51. (Previously Presented) The method of claim 50 wherein the at least one nitrate is ammonium nitrate.

52. (Previously Presented) The method of claim 50 wherein the at least one nitrate is aluminum nitrate.

53. (Previously Presented) The method of claim 50 wherein the at least one nitrate is nitric acid.

54. (Previously Presented) The method of claim 50 wherein the chemical mechanical planarization composition further comprises benzotriazole.

55. (Previously Presented) The method of claim 51 wherein the chemical mechanical planarization composition further comprises benzotriazole.

56. (Currently Amended) The method of claim 50 wherein the hydrazine and the at least one nitrate in aqueous solution comprise an oxidizing solution, which is part of the chemical mechanical planarization composition, wherein the oxidizing solution has a pH between about 5.7 and about 6.5.

57. (Previously Presented) The method of claim 50 wherein the abrasive comprises colloidal silica.

58. (Previously Presented) The method of claim 57 wherein the colloidal silica has a particle size range of between 20 and 150 nanometers.

59. (Previously Presented) The method of claim 50 wherein the phase one slurry to planarize the copper comprises hydrogen peroxide.

60. (Currently Amended) A method of chemical mechanical planarization of a substrate comprising a copper-containing structure, a dielectric, and a barrier layer disposed between the copper-containing structure and the dielectric, the barrier layer comprising tantalum, tantalum nitride, or both, comprising the steps of:

a) providing a substrate comprising a copper-containing structure, a dielectric, and a barrier layer disposed between the copper-containing structure and the dielectric, the barrier layer comprising tantalum, tantalum nitride, or both, wherein the substrate has been chemically mechanically polished with a phase one slurry to planarize the copper ~~to about the level of the barrier/adhesion layer of Ta/TaN overlying a dielectric layer;~~

b) providing a chemical mechanical planarization composition between the substrate and a polishing pad, said composition comprising in aqueous solution ~~ammonium nitrate,~~ aluminum nitrate, ~~or mixture thereof,~~ and at least one abrasive; and,

c) planarizing said barrier/adhesion layer by moving the polishing pad relative to said ~~barrier/adhesion~~ barrier layer while having said chemical mechanical planarization composition therebetween.

61-63. (Cancelled)

64. (Currently Amended) The method of claim ~~62~~ 60 wherein the chemical mechanical planarization composition further comprises a corrosion inhibitor, which comprises benzotriazole.

65-67. (Cancelled)

Please also add new claims 68-75, as follows:

68. (New) A method of chemical mechanical planarization of a substrate comprising a copper-containing structure, a dielectric, and a barrier layer disposed between the copper-containing structure and the dielectric, the barrier layer comprising tantalum, tantalum nitride, or both, comprising the steps of:

a) providing a substrate comprising a copper-containing structure, a dielectric, and a barrier layer disposed between the copper-containing structure and the dielectric, the barrier layer comprising tantalum, tantalum nitride, or both, wherein the substrate has been chemically mechanically polished with a phase one slurry to planarize the copper and to stop upon reaching the barrier layer overlying the dielectric layer;

b) providing a chemical mechanical planarization composition between the substrate and a polishing pad, said composition consisting essentially of a first oxidizer of ammonium nitrate, at least one abrasive, at least one second oxidizer different from the first oxidizer, optionally a corrosion inhibitor, and water; and,

c) planarizing said barrier/adhesion layer by moving the polishing pad relative to said barrier layer while having said chemical mechanical planarization composition therebetween.

69. (New) The method of claim 68, wherein the corrosion inhibitor is present and comprises benzotriazole.

70. (New) The method of claim 68, wherein the ammonium nitrate in aqueous solution comprises an oxidizing solution which is part of the chemical mechanical planarization composition, and wherein the oxidizing solution has a pH between about 5.1 and about 5.5.

71. (New) The method of claim 68, wherein the at least one abrasive comprises colloidal silica.

72. (New) The method of claim 71, wherein the colloidal silica has a particle size range of between 20 and 150 nanometers.

73. (New) The method of claim 68, wherein the second oxidizer comprises hydrazine.

74. (New) A method of chemical mechanical planarization of a substrate comprising a copper-containing structure, a dielectric, and a barrier layer disposed between the copper-containing structure and the dielectric, the barrier layer comprising tantalum, tantalum nitride, or both, comprising the steps of:

a) providing a substrate comprising a copper-containing structure, a dielectric, and a barrier layer disposed between the copper-containing structure and the dielectric, the barrier layer comprising tantalum, tantalum nitride, or both, wherein the substrate has been chemically mechanically polished with a phase one slurry to planarize the copper and to stop upon reaching the barrier layer overlying the dielectric layer;

b) providing a chemical mechanical planarization composition between the substrate and a polishing pad, the composition comprising in aqueous solution, hydroxylamine nitrate, at least one nitrate which is not hydroxylamine nitrate, and at least one abrasive, wherein the chemical mechanical planarization composition is acidic; and

c) planarizing said barrier layer by moving the polishing pad relative to said barrier layer while having said chemical mechanical planarization composition therebetween, wherein the planarizing step results in selective planarization of the barrier layer.

75. (New) A method of chemical mechanical planarization of a substrate comprising a copper-containing structure, a dielectric, and a barrier layer disposed between the copper-containing structure and the dielectric, the barrier layer comprising tantalum, tantalum nitride, or both, comprising the steps of:

a) providing a substrate comprising a copper-containing structure, a dielectric, and a barrier layer disposed between the copper-containing structure and the dielectric, the barrier layer comprising tantalum, tantalum nitride, or both, wherein the substrate has been chemically mechanically polished with a phase one slurry to planarize the copper and to stop upon reaching the barrier layer overlying the dielectric layer;

b) providing a chemical mechanical planarization composition between the substrate and a polishing pad, said composition comprising in aqueous solution aluminum nitrate and at least one abrasive; and,

c) planarizing said barrier/adhesion layer by moving the polishing pad relative to said barrier layer while having said chemical mechanical planarization composition therebetween.